



Formulation And Evaluation Of Mouthwash Using Herbal Ingredients To Prevent Dental Problem

¹ Shridhar Pandya, ² Dr Ravi Patel, ³ Ms Mansi Soni

B Pharmacy Final Year

¹Assistant Professor, Department of Pharmaceutics, Shree Swaminarayan College of Pharmacy, Swaminarayan university, Kalol, Dist. Gandhinagar-382725, Gujarat, India.

² Dean of shree Swaminarayan college of pharmacy, Swaminarayan University, Kalol, Dist. Gandhinagar-382725, Gujarat

³B. Pharmacy Final Year student, Shree Swaminarayan college of pharmacy, Swaminarayan University, Kalol, Dist. Gandhinagar-382725, Gujarat

Abstract: Medicinal flora, play an critical position in the treatment and prevention of disorder because of their antimicrobial activity. Oral rinses are one of the most crucial chemicals as a part of oral health care in our day by day lives. The aim of this study to have a look at was to create and check a singular natural mouthwash that synergistically combines herbal substances recognized to have oral health benefits. The components contained Myrrh (*Commiphora myrrha*) powder, Citrus limon (lemon). Drops, Eucalyptus spp. Oil, Syzygium aromaticum (clove) oil, Cinnamomum verum (cinnamon) oil, honey, and other excipients consisting of sodium lauryl sulfate, glycerin, and vitamin E. The ensuing light brown answer, which peppermint aroma and spice flavor with a moderate sweetness, 5.5-5. It exhibited a pH of 6.0 and terrific homogeneity. Antimicrobial studies revealed no increase of microorganisms after 24 hours, indicating the opportunity of powerful disinfection due to herbal synergy No alcohol became used time who were preparing to avoid any aspect consequences. This observe efficaciously verified the ability of mixing conventional natural understanding with modern formulations to create a powerful, natural oral care product.

Index Terms – Herbal mouthwash, Myrrh, Citrus lemon, Eucalyptus oil, Clove oil, Cinnamon oil, Honey, Antimicrobial, Anti-inflammatory, Dental disorder.

1.0 INTRODUCTION

1.1 History

The use of mouthwash-like arrangements may be traced back to historical times, with proof suggesting that the Babylonians, Greeks, and Romans hired numerous herbal and aromatic mouth-rinsing solutions for oral hygiene and ceremonial functions. One of the earliest documented mouthwash formulations changed into recorded inside the Ebers Papyrus, an ancient Egyptian medical textual content courting back to around 1500 BCE, which covered a recipe for a mouth-rinsing answer made from herbs and wine. In the 9th century, the Persian doctor and logician Al-Razi (Rhazes) advocated a mouth-rinsing solution crafted from herbs, vinegar, and salt, believed to have antimicrobial and cleansing houses.

- The modern-day idea of mouthwash as a commercialized product may be attributed to the paintings of Joseph Lister, a pioneering medical professional who added the usage of antiseptic solutions in scientific practices in the late 19th century, paving the manner for the development of antiseptic mouthwashes.
- The first business mouthwash, referred to as "Listerine," was brought in 1879 with the aid of Dr. Joseph Lawrence and initially advertised as a surgical antiseptic. It wasn't till the Twenties that it was repositioned as a mouthwash and became a household product.
- In recent many years, the mouthwash industry has witnessed a surge inside the improvement of herbal and herbal formulations, driven by way of growing client demand for eco-friendly and sustainable merchandise and a growing interest in traditional remedy and natural treatments.

1.2 Herbal Mouthwash

The mouthwash is defined as a nonsterile aqueous answer used ordinarily for its deodorant, clean or antiseptic effect and also designed to lessen oral microorganism, put off meal's particle, briefly lessen horrific breath and bring nice take a look at. The energetic components in mouthwash may be an Antibacterial (to lessen the bacterial flowers across the lesion), antihistamine (for neighborhood anesthetic effect), antifungal (to forestall any fungal growth), steroid (to reduce infection), a nearby anesthetic or pain reliver or mixture of these substances. Some different additional marketers are frequently included to provide coloration, taste, sweetness or balance. Many problems, together with halitosis, gum ailment, periodontitis, oral malodor, and plaque, are dealt with mouthwash. We ought to prefer herbal mouthwashes as they offer a synergistic blend of natural plant extracts with huge-spectrum healing capacity, aligning with holistic principles and minimizing the threat of detrimental effects related to synthetic substances. These green and sustainable formulations not best promote oral health however additionally preserve cultural history by way of drawing upon traditional know-how. Additionally, herbal mouthwashes provide a nice sensory revel in with their natural aromas and flavors, while providing a wealthy supply for ongoing studies and innovation inside the subject of oral healthcare.

1.3 Advantages of Herbal Mouthwash

- **Broad-spectrum antimicrobial activity:** Herbal mouthwashes regularly include a synergistic combination of plant extracts and crucial oils with antimicrobial homes, making them powerful against a huge variety of oral pathogens, along with microorganism, fungi, and viruses.
- **Anti-inflammatory properties:** Many herbs and botanicals used in herbal mouthwashes, along with turmeric, ginger, and inexperienced tea, own effective anti-inflammatory compounds which could assist reduce irritation within the oral cavity, making them beneficial for situations like gingivitis and periodontitis.
- **Antioxidant protection:** Herbal mouthwashes are wealthy in antioxidants, that may help neutralize harmful loose radicals and oxidative stress in the mouth, thereby protective in opposition to cellular damage and probably decreasing the risk of oral most cancers.
- **Wound-healing properties:** Certain herbs, like aloe vera, calendula, and chamomile, had been historically used for his or her wound-recuperation capabilities, making herbal mouthwashes probably useful for promoting the recovery of oral lesions, ulcers, and put up-surgical wounds.
- **Fresher breath:** Many herbal mouthwashes include natural elements like peppermint, clove, cinnamon, and lemon, which could efficiently mask and neutralize Odor-inflicting compounds, imparting lengthy-lasting fresh breath.
- **Remineralization potential:** Some herbal mouthwashes may additionally incorporate ingredients like inexperienced tea extract or natural resources of calcium and phosphate, that may contribute to the remineralization of tooth teeth, potentially reducing the hazard of teeth decay.
- **Compatibility with natural oral microbiome:** Herbal mouthwashes are usually more compatible with the herbal oral microbiome, as they do no longer indiscriminately kill all bacteria, however rather selectively goal dangerous pathogens while keeping beneficial commensal microorganism.
- **Minimal risk of staining:** Unlike a few traditional mouthwashes that incorporate components like chlorhexidine, that can cause tooth staining and discoloration, natural mouthwashes are less

possibly to purpose such troubles, making them a safer alternative for people worried approximately keeping a vivid smile.

- **Culturally significant and traditionally rooted:** Many herbal mouthwash formulations are rooted in historical conventional medicinal drug practices, drawing upon centuries of accumulated expertise and cultural heritage, making them appealing to the ones in search of a reference to their cultural roots.

1.4 Use of Herbal mouthwash

- **Anti-plaque and anti-gingivitis agent:** The antimicrobial homes of herbal elements like myrrh, clove, cinnamon, and eucalyptus can help prevent plaque buildup and decrease gingival irritation, making it beneficial for maintaining true oral hygiene and preventing periodontal diseases.
- **Breath freshener:** The robust minty aroma from the critical oils and the refreshing Flavors from lemon and honey can efficiently mask and neutralize horrific breath, supplying a protracted-lasting fresh breath revel in.
- **Oral wound healing:** Myrrh and honey possess wound-healing properties that can aid within the healing of oral ulcers, cuts, or submit-surgical wounds inside the oral hollow space.
- **Dry mouth relief:** The inclusion of honey and glycerine can assist counter dry mouth (xerostomia) by means of offering a relaxing and moisturizing effect, making it beneficial for individuals with reduced saliva manufacturing.
- **Oral cancer prevention:** The antioxidant residences of the natural ingredients can also make a contribution to neutralizing loose radicals and lowering oxidative stress, potentially lowering the danger of oral most cancers development.
- **Tooth remineralization:** The presence of diet E and different herbal compounds within the components may additionally guide the remineralization of enamel tooth, promoting stronger and more healthy enamel.
- **Post-operative oral hygiene:** The antiseptic and anti-inflammatory houses of the herbal mouthwash make it a appropriate option for retaining oral hygiene and selling restoration after dental processes or oral surgeries.
- **Complementary therapy for oral candidiasis:** The antifungal homes of sure natural components like clove and cinnamon can potentially usefully resource in coping with oral candidiasis (thrush) as a complementary therapy to standard remedies.
- **Soothing oral mucositis:** The natural anti-inflammatory and analgesic additives in the system may provide relief from oral mucositis, a not unusual side effect of radiation remedy or chemotherapy in most cancers sufferers.

1.5 Introduction to Drug Profile

1) Myrrh:

Biological Source- The biological source of myrrh is the Commiphora myrrh tree, also known as the myrrh tree or myrrh bush. Myrrh is obtained from the resin produced by this tree.

Chemical constituent- Eugenol, Cinnamic acid, Cinnamyl alcohol.



Fig. 1.1 Myrrh

Myrrh is a natural resin received from small, thorny timber of the genus Comephorid, which belong to the Burseraceae circle of relatives The system of harvesting myrrh involves making small incisions or cuts in the bark of the Comephorid bushes. This lets in the sap, or resin, to go with the flow out of the injuries. Initially, the resin is a sticky, milky-white liquid, however upon exposure to air, it regularly hardens into irregularly shaped, brownish-pink or yellow-brown droplets. Myrrh has been valued for its fragrant fragrance as well as its medicinal and ceremonial homes, for thousands of years. It has Been used in conventional medicine, perfumery, religious rituals, and as incense.

2) Eucalyptus:

Biological Source- Eucalyptus oil is the volatile oil obtained by the distillation of the fresh leaves of *Eucalyptus globulus* and other species of *Eucalyptus*, belonging to the family **Myrtaceae**.

Chemical constituents- α -Pinene, β -Pinene, Limonene



Fig. 1.2 Eucalyptus

It is a powerful antimicrobial and anti-inflammatory agent, combating bad breath and gingivitis stimulates saliva production, promoting oral health.

3) Clove:

Biological Source- Cloves are the aromatic flower buds of the *Syzygium aromaticum* tree, belonging to the family **Myrtaceae**.

Chemical constituents- α -Pinene, β -Pinene, Limonene



Fig. 1.3 Clove

Clove (*Syzygium aromaticum*) oil, rich in eugenol, offers amazing analgesic and antiseptic homes. These features make it valuable for assuaging toothaches, fighting oral infections, and inhibiting plaque formation.

4) Cinnamon:

Biological Source- Cinnamon is obtained from the inner bark of trees belonging to the *Cinnamomum* genus, primarily *Cinnamomum verum* (true cinnamon) or *Cinnamomum cassia* (cassia cinnamon).

Chemical constituents- Cinnamaldehyde, Cinnamic acid, Coumarin, Procyanidins.



Fig. 1.4 Cinnamon

Cinnamon (*Cinnamomum verum*) oil, with its primary constituent cinnamaldehyde, exhibits robust antimicrobial activity against a wide spectrum of oral bacteria and fungi. Additionally, its anti-inflammatory effects can help mitigate gum inflammation, while its pleasant aroma contributes to natural breath freshening.

1.6 Ingredient table:

Sr. no.	Ingredients	Scientific name	Chemical constituents	Use
1	Myrrh	Commiphora myrrha	Eugenol	Antiseptic
2	Eucalyptus	Eucalyptus globulus	α -Pinene	Decongestant
3	Clove	Syzygium aromaticum	β -Caryophyllene	Analgesic
4	Cinnamon	Cinnamomum verum	Cinnamaldehyde	Antidiabetic
5	Lemon	Citrus limon	Ascorbic Acid	Astringent
6	Vitamin E	Tocopherol	α -Tocopherol	Antioxidant
7	Glycerin	Glycerol	Propane-1,2,3-triol	Humectant
8	Honey	Apis	Fructose	Wound-healing, Sweetening agent
9	Sodium Lauryl Sulfate	-	Sodium dodecyl sulfate	Surfactant
10	Purified water	-	-	Adjusting texture

Table 1.1: List of ingredients

EXPERIMENTAL SECTION

2.0 MATERIALS AND METHODS

2.1 Materials:

Sr. No.	Materials
1	Myrrh powder
2	Eucalyptus oil
3	Clove oil
4	Cinnamon powder
5	Lemon drops
6	Vitamin E tablet
7	Glycerin
8	Honey
9	Sodium Lauryl Sulfate
10	Purified water

Table 2.1: List of materials:

Sr. No.	Materials
1	Measuring cylinder
2	Beaker
3	Mortar pestle
4	volumetric flasks
5	Funnel
6	Water bath
7	Autoclave
8	Petri dish
9	pH meter
10	Whatman filter paper

Table 2.2: List of Equipment:

2.2 Method:

Preparation of herbal mouthwash:

- In a clean bowl, combine 0.5 gm of myrrh powder, and 0.5 gm of SLS (Sodium Lauryl Sulphate), and crush 1 tablet of vitamin E. Mix the ingredients well.
- Add 0.1 ml each of clove oil (*Syzygium aromaticum*), cinnamon oil (*Cinnamomum verum*), and eucalyptus oil (*Eucalyptus* spp.) to the bowl. Stir to incorporate.
- Add 5 drops of lemon drops (*Citrus limon*) to the mixture and continue stirring.
- In a separate container, combine 5 ml of honey (*Apis* spp.) with 5 ml of glycerine. Stir until well blended.
- Slowly pour the honey-glycerine mixture into the bowl containing the dry ingredients, while stirring continuously to form a smooth, homogeneous mouthwash base.
- If necessary, adjust the consistency by adding additional purified water until the desired texture is achieved.
- Transfer the mouthwash into a clean, sterilized bottle or container with a tight-fitting lid to maintain freshness and hygiene.

2.3 Formulation Table

Sr. No.	Ingredients	F1 (ml)	F2 (ml)
1	Myrrh powder	1.5 gm	0.5 gm
2	Eucalyptus oil	0.5 ml	0.1 ml
3	Clove oil	0.5 ml	0.1 ml
4	Cinnamon powder	1 gm	0.5 gm
5	Lemon drops	5 drops	5 drops
6	Vitamin E Cap	1 capsule	1 capsule
7	Glycerin	5 ml	5 ml
8	Honey	5 ml	5 ml
9	Sodium Lauryl Sulfate	0.5 gm	0.5 gm
10	Purified water	88 ml	89.55 ml
11	Total volume	100	100

Table 2.3 Two different formulations of polyherbal mouthwash

2.4 Evaluation parameter of prepared mouthwash

- 1) **Colour and Odor:** Physical parameter like shade and Odor have been examined via visible observe.
- 2) **pH:** PH of organized herbal mouthwash was measured with the aid of using digital pH meter the pH meter was calibrated the use of fashionable buffer approximately 1 ml of mouthwash become weighed and dissolved in 50 ml of distilled water and its pH became measured through pH meter.

3) Test for microbial growth in formulated mouthwash:

The formulated mouthwash became inoculated within the plates of agar media by way of streak plate approach and a control become prepared. The plates had been placed within the incubator and are incubated at 37°C for twenty-four hours. After the incubation duration plates had been taken out and checked for microbial increase by way of evaluating it with the manage.

4) Stability Studies

The components and instruction of any product is incomplete without right stability research of the prepared product. A trendy approach for predicting the stableness of any product is increased balance studies, where the product is subjected to improved temperature as per the ICH hints. A brief time period multiplied balance look at changed into accomplished throughout 3 months for the prepared components. The samples have been stored at underneath the following situation of temperature as 3-50 C, 250 C RH=60%, 400 C $\pm$ 2% RH= 75%. Finally, the samples saved beneath extended observe have been withdrawn on month-to-month periods and were analysed.

2.5 RESULT AND DISCUSSION

• Organoleptic test:

Color: Evaluate the light brown color of the mouthwash and its uniformity.

Odor: Assess the spicy and light sweet smell of the mouthwash.

Taste: considering the flavors contributed by the herbal ingredients it has a spicy strong taste.

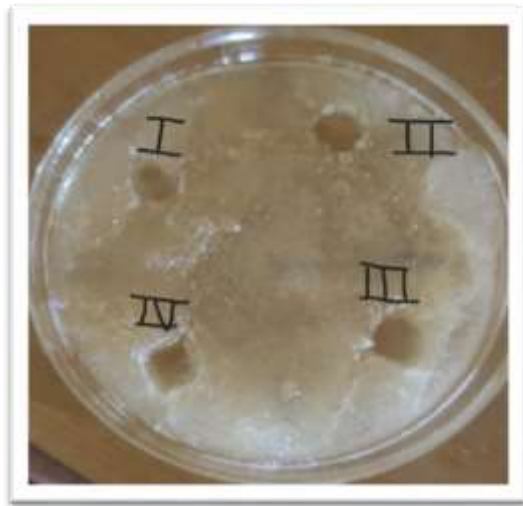
- **pH stability:** This test is monitored using a well-calibrated pH meter. the pH of the mouthwash, which is in the range of 5.5 to 6.0 as it is best for optimal oral health and safety.

Evaluation	Observation
Visual Appearance	Light brown
Odor	Strong mint
Taste	Spicy with a little bit of sweetness
pH	Between 5.5 - 6.0
Homogeneity	Good

Table 3.1 Result and Observation

• Antimicrobial test:

- 1.4 grams of agar powder is dissolved in warm water while continuously stirring until the powder is completely dissolved.
- The mixture is then allowed to cool down to room temperature
- After cooling, the mixture is carefully transferred into Petri plates and solidified by placing the plates on ice bags or icecubes.
- Once solidified, wells or cavities are made in the agar plates using a sterile cork borer or a similar tool.
- The herbal mouthwash sample is carefully pipetted and filled into the designated wells or cavities in the agar plates.
- The inoculated agar plates are then incubated at the appropriate temperature for 24 hours, allowing the microorganisms to grow and interact with the mouthwash samples.
- After the incubation period of 24 hours, the plates are observed for the formation of zones of inhibition, which are clear areas around the wells or cavities where the microorganisms have not grown due to the antimicrobial activity of the mouthwash.
- The diameters of these zones of inhibition are measured using a ruler or a calipers to quantify the antimicrobial efficacy of the herbal mouthwash against the tested microorganism.



After 4 hours of incubation



After 24 hours of incubation

Time	Microbial growth	Appearance
After 4 hours	No growth	Good
After 24 hours	No growth	Good

• Stability Studies:



Fig. 4.2 Herbal Mouthwash

2.6 Discussion on Herbal Mouthwash:

"This observe, inspired by means of the historical use of natural mouth-rinsing solutions for oral hygiene and ceremonial purposes, aimed to formulate and compare a singular natural mouthwash. The formula strategically integrated natural substances famed for their oral health advantages, including the antimicrobial Myrrh (*Commiphora myrrha*) powder, anti-inflammatory Eucalyptus spp. Oil, analgesic *Syzygium aromaticum* (clove) oil, and others.

The resulting mild brown mouthwash, with its robust mint aroma and highly spiced taste softened via a hint of sweetness, now not handiest exhibited appropriate sensory attributes but also tested promising oral fitness houses. Its pH range of 5.5-6.0 aligns well with the herbal pH of saliva, selling a wholesome oral surroundings (Khatoon et al., 2020). The absence of microbial increase after 24 hours of incubation underscores the effective antimicrobial houses of the method, likely a result of the synergistic interplay the various natural antimicrobial factor."

2.7 Conclusion:

- In end, let's look at successfully evolved and evaluated a novel natural mouthwash method that synergistically combines the therapeutic residences of herbal substances with ideal sensory attributes. By harnessing the antimicrobial prowess of myrrh, the anti-inflammatory consequences of eucalyptus, the analgesic qualities of clove, and the multifaceted benefits of different botanicals, we've got created a method that now not best promotes oral fitness but also gives a nice consumer experience.
- The inclusion of honey and glycerine contributed to the formulation's sweetness and viscosity, respectively, improving its universal palatability without compromising its healing efficacy. The mouthwash's performance in antimicrobial checks underscores its capability as a natural alternative to synthetic oral care products.
- This task exemplifies the capability of integrating traditional herbal wisdom with contemporary components techniques to create effective, herbal, and consumer-friendly oral care solutions. It paves the way for similarly research and improvement within the realm of herbal dentifrice, aligning with the growing patron demand for herbal, sustainable, and holistic health products.

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